

## REVIEWS

*The Evolution of Land Plants [Embryophyta]*. By DOUGLAS HOUGHTON CAMPBELL. Pp. 1-731 with 351 text figures. Stanford University Press. 1940.

This large volume has two main elements. It is a résumé of the author's half century of morphological, chiefly embryological, study; and it is a condensed summary of the work of other writers on the relationships of the higher plants. Of these, the former is the more valuable, which is natural since Dr. Campbell has himself been the foremost contributor to our understanding of the broader lines of the evolution of the land plants. It is as to these broad lines, where the work of the past fifty years has brought confidence in some things and doubt as to others, that this book registers well the present state of science and can serve as a mile post.

The larger part of the book is taken up by the finer classification, to orders, families, in some places to genera. Here the author depends more upon the views of others, and the presentation is distinctly less authoritative. For example, among the ferns, the Eusporangiatae are well presented, but the treatment of the higher Leptosporangiatae is comparatively weak.

In accord with custom, the evidence of paleophytology is treated with respect. This science has of course made progress in various respects. But the reviewer would still recall a remark of Dr. Joseph Hooker. "Amongst the many collections of fossil plants that I have examined, there is hardly a specimen, belonging to any epoch, sufficiently perfect to warrant the assumption that the species to which it belonged can be recognized." Yet, specific characters may petrify better than those of classes. Consider spermatozoids and the embryo-sac. A discussion of the nature and value of evidence would be a valuable introduction to a book of this kind.

Next to its completeness, the most marked characteristic of the book is its lack of dogmatism. Correlated with caution is a tendency to entertain the idea of multiple origin of apparently natural groups, and to admit question, even where affinity seems best established. Two examples: the probable central position of some such plant as *Anthoceros* in the ancestry of Embryophyta is perfectly presented, and the group "Anthocerotes" is made a class, coordinate with Hepaticae and Musci. The latter are treated as probable derived groups, but the derivation seems to be pictured as exceedingly ancient, from primeval Anthocerotes, of which "Of course, the sporophyte . . . must have been much simpler than in any living forms—perhaps comparable to that of such liverworts as *Riccia* or *Sphaerocarpus*." To the reviewer, the stoma, common to *Anthoceros* and many mosses, provides positive proof that their common ancestor, if not exactly *Anthoceros* itself, had at any rate a sporophyte independent enough in its nutrition to have evolved this structure.

As to the angiosperms, polyphyletic is explicitly advocated. The characteristic structure of this group is not seed, nor flower, nor pollen tube, nor trachea; it is the embryo-sac. If the hypothesis of multiple origins means that this structure has been evolved several times independently, it is hard to accept. Even more than the stoma, it requires good evidence of repeated evolution before it is questioned as proof of real affinity.

There are 351 numbered figures, most of which are composed of a considerable number of drawings, largely original and well reproduced. They add materially to the value of the book. The text is a remarkable mine of detailed information. How much there is of this may be shown by the index, which occupies 37 pages of fine print, two columns to the page, and is still incomplete; thus, under "stoma" there is no reference to the text, and under "embryo-sac" there is only one.—E. B. COPELAND, Department of Botany, University of California, Berkeley.

*Sinopsis de la Flora del Cuzco.* FORTUNATO L. HERRERA. Tomo I. Parte Sistemática. Pag. 1–528. Publicado bajo los auspicios del supremo gobierno. Lima, Peru, 4 de Julio, 1941.

This check list of the plants of the Department of Cuzco by the distinguished Peruvian botanist is by far the most complete of several similar works by the same author, the first of which appeared in 1919. It lists 2166 species (with a few varieties) 588 of which are cryptogams, about 250 of these being ferns and fern allies. Even so, the author suggests that probably only about one-half of the species growing within the area have been recorded. The predominant families are Compositae, Gramineae, and Leguminosae.

The names are accompanied, at least for the phanerogams, by source of publication and citation of specimens. The latter are given in detail, usually including altitude, information which will be invaluable in any study of the flora; habitats, however, are rarely indicated. Often the range of the plant outside of Cuzco, if known, is mentioned; there are some economic notes. An appendix contains descriptions of new species based on the author's collections. There is also a list of native names and their scientific equivalents, and an index to the genera.

In a work of this nature, based of necessity on the literature available—of which there is a good bibliography—there are of course always omissions; on the other hand there are a few additions to the flora of Cuzco. In supplements, which it is to be hoped will be issued from time to time, it would be well to give the source of determination and to indicate where the collections may be consulted in order that identifications may be checked when desired. The work would be more consistently useful, too, if publication citations were always given (which is obviously the intent but they are not infrequently omitted). Most of the typographical errors will easily be corrected; only one mistake in the